

## 1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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### 1.1 Standard Applicable

According to § 1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

#### (a) Limits for Occupational / Controlled Exposure

| Frequency range<br>(MHz) | Electric Field<br>Strength (E)<br>(V/m) | Magnetic Field<br>Strength (H)<br>(A/m) | Power Density<br>(S) (mW/cm <sup>2</sup> ) | Averaging Times<br>  E   <sup>2</sup> ,   H   <sup>2</sup> or<br>S (minutes) |
|--------------------------|---|---|--|--|
| 0.3-3.0                  | 614                                     | 1.63                                    | (100)*                                     | 6  |
| 3.0-30                   | 1842/f                                  | 4.89/f                                  | (900/f)*                                   | 6  |
| 30-300                   | 61.4                                    | 0.163                                   | 1.0  | 6  |
| 300-1500                 | /                                       | /                                       | F/300                                      | 6  |
| 1500-100000              | /                                       | /                                       | 5  | 6  |

#### (b) Limits for General Population / Uncontrolled Exposure

| Frequency range<br>(MHz) | Electric Field<br>Strength (E)<br>(V/m) | Magnetic Field<br>Strength (H)<br>(A/m) | Power Density<br>(S) (mW/cm <sup>2</sup> ) | Averaging Times<br>  E   <sup>2</sup> ,   H   <sup>2</sup> or<br>S (minutes) |
|--------------------------|---|---|--|--|
| 0.3-1.34                 | 614                                     | 1.63                                    | (100)*                                     | 30   |
| 1.34-30                  | 824/f                                   | 2.19/f                                  | (180/f)*                                   | 30   |
| 30-300                   | 27.5                                    | 0.073                                   | 0.2  | 30   |
| 300-1500                 | /                                       | /                                       | F/1500                                     | 30   |
| 1500-100000              | /                                       | /                                       | 1  | 30   |

Note: f = frequency in MHz: \* = Plane-wave equivalents power density

### 1.2 MPE Calculation Method

$$S = (30 \cdot P \cdot G) / (377 \cdot R^2)$$

S = power density (in appropriate units, e.g., mw/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,  
the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

### 1.3 MPE Calculation Result

Wifi:

Maximum peak output power: 10.13 (dBm)

Maximum peak output power at antenna input terminal: 10.30(mW)

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain: 1.37 (dBi)

Directional gain: 1.37 (numeric)

The worst case is power density at prediction frequency at 20cm: 0.028(mw/cm<sup>2</sup>)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm<sup>2</sup>)

$$0.0028(\text{mw}/\text{cm}^2) < 1 (\text{mw}/\text{cm}^2)$$

Result: Pass